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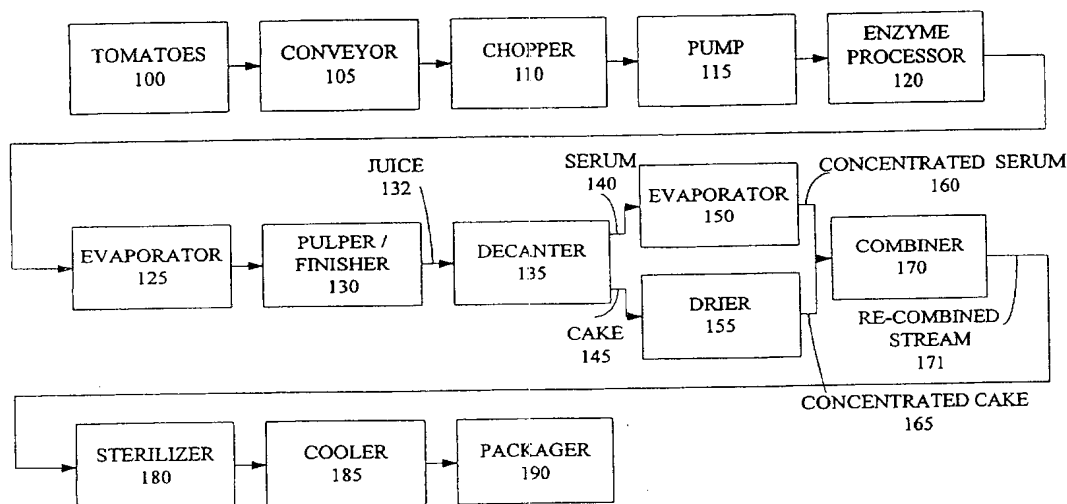
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(54) Title: SYSTEM AND METHOD FOR PRODUCING CONCENTRATED FOOD PRODUCTS WITH FRACTIONATION CONCENTRATION



(57) Abstract: An improved processing method and system for producing tomato paste and other food products affected by viscosity. Tomatoes are processed into tomato juice. The juice is provided to a decanter that separates or fractionates the juice into two portions - a thicker, more viscous cake portion and a thinner, less viscous serum portion. The serum portion is concentrated by removing a portion of water using an evaporator such as a thin film or juice evaporator. The cake portion can be concentrated if necessary with a drier. The serum and cake portions are recombined to produce a tomato paste having improved color, texture, flavor and nutrition.

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*For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*

## AMENDED CLAIMS

**[Received by the International Bureau on 12 August 2003 (12.08.03) :  
original claims 1, 25, 26, 33 and 67 replaced by amended claims 1, 25, 26, 33 and 67  
original claims 3, 4, 23, 24, 35, 36, 55, 62-66 and 68-71 are cancelled (10 pages)]**

1. A method of processing tomatoes to form a tomato product, comprising:  
separating a tomato stream into a first portion comprising a cake portion and a  
second portion comprising a serum portion using a decanter that includes a weir and a scraping  
mechanism by rotating said decanter to force said cake portion against an inner surface of said  
decanter, separating said cake and serum portions with said weir, and removing said cake  
portion collected along said inner surface with said scraping mechanism, said cake portion  
having a greater viscosity than said serum portion;  
concentrating said serum portion; and  
combining said cake portion and said concentrated serum portion to yield the  
tomato product.
2. The method of claim 1, wherein separating said tomato stream further comprises  
separating a tomato juice stream formed from raw tomatoes.
3. (Cancelled)
4. (Cancelled)
5. The method of claim 1, wherein said first portion comprises about 5% to 35% of  
said tomato stream by weight.
6. The method of claim 1, wherein said first portion comprises about 5% to 60%  
insoluble solids by weight.
7. The method of claim 1, wherein said cake first portion comprises about 3% to 16%  
soluble solids by weight.
8. The method of claim 1, wherein said first portion has a concentration of about 3 to  
13 brix.
9. The method of claim 1, wherein said first portion includes a majority of a color  
compound relative to said second portion.

1           10.    The method of claim 9, wherein said color compound comprises lycopene.

5           11.    The method of claim 1, wherein said first portion includes a majority of insoluble  
solids relative to said second portion.

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- 1           12. The method of claim 1, wherein said second portion comprises about 65% to 95%  
of said tomato stream by weight.
- 5           13. The method of claim 1, wherein said second portion comprises about 0.01% to  
10% insoluble solids by weight.
- 10           14. The method of claim 1, wherein said second portion comprises about 3% to 17%  
soluble solids by weight.
- 15           15. The method of claim 1, wherein said second portion has a concentration of about 3  
to 16 brix.
- 20           16. The method of claim 1, wherein said concentrated second portion has a  
concentration of about 22 to 75 brix.
- 25           17. The method of claim 1, before separating said stream into said first and second  
portions, further comprising processing the tomato product into said tomato stream.
- 30           18. The method of claim 17, wherein processing the tomato product further comprises:  
chopping one or more tomatoes into tomato pieces; and  
removing solids from said tomato pieces.
- 35           19. The method of claim 18, wherein removing said solids further comprises filtering  
tomato skins and seeds with a filter screen.
20. The method of claim 1, further comprising inactivating one or more enzymes in  
said stream.
21. The method of claim 20, wherein said one or more enzymes is pectin  
galacturonase or pectin methyl esterase.

1           22. The method of claim 20, wherein inactivating said one or more enzymes further  
comprises subjecting said stream to a temperature of about 150 to 230 degrees Fahrenheit for a  
period of about 15 seconds to 10 minutes.

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1           23.   (Cancelled)

          24.   (Cancelled)

5           25.   The method of claim 1, further comprising removing said first portion collected  
against said inner surface through a first portion outlet of said decanter.

10          26.   The method of claim 1, further comprising removing said second portion within  
said decanter through a second portion outlet of said decanter.

15          27.   The method of claim 1, wherein concentrating said second portion further  
comprises concentrating said stream at a temperature of about 190 to about 210 degrees  
Fahrenheit in a vacuum of about 10 to about 30 Hg.

          28.   The method of claim 1, wherein concentrating said second portion further  
comprises dehydrating said second portion with an evaporator.

20          29.   The method of claim 28, wherein said evaporator is a thin film evaporator, a rising  
film evaporator, a falling film evaporator, a reverse osmosis concentrator, or a direct osmosis  
concentrator.

25          30.   The method of claim 1, further comprising concentrating said first portion.

          31.   The method of claim 30, wherein said first portion is concentrated with a drier.

30          32.   The method of claim 1, wherein the tomato product comprises tomato paste.

35          33.   A system for processing a tomato stream to form a tomato product, comprising:  
a decanter including a weir and a scraping mechanism, said decanter configured to  
receive the tomato stream, and fractionate the stream into a first portion comprising a cake

1 portion and a second portion comprising a serum portion by rotating said decanter and  
separating said cake and serum portions using said weir, and removing said cake portion  
collected along an interior surface of said decanter, wherein said cake portion has a greater  
viscosity than said serum portion;

5 an evaporator for concentrating said serum portion; and  
a combination unit for combining said cake portion and said concentrated serum  
portion to form the tomato product.

10 34. The system of claim 33, wherein the tomato stream comprises a tomato juice  
stream formed from raw tomatoes.

35. (Cancelled)

15 36. (Cancelled)

37. The system of claim 33, wherein said first portion comprises about 5% to 35% of  
the tomato stream.

20 38. The system of claim 33, wherein said first portion comprises about 5% to 60%  
insoluble solids.

39. The system of claim 33, wherein said first portion comprises about 3% to 16%  
soluble solids.

25 40. The system of claim 33, wherein said first portion has a concentration of about 3 to  
13 brix.

30 41. The system of claim 33, wherein said first portion includes a majority of a color  
compound relative to said second portion.

42. The system of claim 41, wherein said color compound comprises lycopene.



1           43. The system of claim 33, wherein said first portion includes a majority of insoluble  
solids relative to said second portion.

5           44. The system of claim 33, wherein said second portion comprises about 65% to 95%  
of the tomato stream by weight.

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1           45. The system of claim 33, wherein said second portion comprises about 0.01% to 10% insoluble solids by weight.

5           46. The system of claim 33, wherein said second portion comprises about 3% to 17% soluble solids by weight.

          47. The system of claim 33, wherein said second portion has a concentration of about 3 to 16 brix.

10          48. The system of claim 33, wherein said concentrated second portion has a concentration of about 22 to 75 brix.

          49. The system of claim 33, further comprising a processing system for processing tomatoes into the tomato stream.

15          50. The system of claim 49 wherein said processing system comprises  
            a chopper for cutting tomatoes into tomato pieces; and  
            a pulper for removing solids from said tomato pieces.

20          51. The system of claim 50 wherein said pulper is configured to remove solids comprising skins and seeds by filtering said solids with a filter screen.

          52. The system of claim 33, further comprising an enzyme deactivation system for inactivating one or more enzymes in the tomato stream.

25          53. The system of claim 52, wherein said one or more enzymes is pectin galacturonase or pectin methyl esterase.

30          54. The system of claim 52, wherein said enzyme inactivation system is configured to inactivate said one or more enzymes by subjecting the stream to a temperature of about 150 to 230 degrees Fahrenheit for a period of about 15 seconds to 10 minutes.

          55. (Cancelled)

1 56. The system of claim 33, wherein said decanter defines a first portion outlet through which said first portion collected against said inner surface of said decanter is removed.

5 57. The system of claim 33, wherein said decanter defines a second portion outlet through which said second portion is removed.

58. The system of claim 33, wherein said evaporator concentrates said second portion at a temperature of about 190 to about 210 degrees Fahrenheit in a vacuum of about 10 to 30 Hg.

10 59. The system of claim 33, wherein said evaporator is a thin film evaporator, a rising film evaporator, a falling film evaporator, a reverse osmosis concentrator or a direct osmosis concentrator.

15 60. The system of claim 33, further comprising a drier for concentrating said first portion.

61. The system of claim 33, wherein said tomato product comprises tomato paste.

20 62. (Cancelled)

63. (Cancelled)

64. (Cancelled)

25 65. (Cancelled)

1           66. (Cancelled)

          67. (Currently Amended) A system for processing tomatoes to form a tomato paste,  
comprising:

5           a decanter including a weir and a scraping mechanism, said decanter configured to  
receive said tomatoes and fractionate said tomatoes into a cake portion and a serum portion,  
wherein said cake portion has a greater viscosity than said serum portion by rotating said  
decanter and separating said cake and serum portions using said weir, and

10           removing said cake portion collected along an interior surface of said decanter,  
wherein said cake portion has a greater viscosity than said serum portion;

          an evaporator for concentrating said serum portion;

15           a drier for concentrating said cake portion; and

          a combination unit for combining said concentrated cake and concentrated serum  
portions form the tomato paste.

20           68. (Cancelled)

          69. (Cancelled)

25           70. (Cancelled)

          71. (Cancelled)